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SUBJECT: Report No. 06-04A3, "Transportability Testing of the Joint Modular Intermodal Platform (JMIP)", TP-94-01, "Transportability Testing Procedures"

1. Enclosed please find subject report dated November 2006.

2. The POC is the undersigned, SJMAC-DEV, DSN 956-8908.

FOR THE DIRECTOR:

for JERRY W. BEAVER
Chief, Validation Engineering Division

Encl
as

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FINAL REPORT
NOVEMBER 2006

REPORT NO. 06-04A3

TRANSPORTABILITY TESTING OF THE JOINT MODULAR INTERMODAL PLATFORM (JMIP) TP-94-01, "TRANSPORTABILITY TESTING PROCEDURES"

Prepared for:

TACOM/ ARDEC
Logistics Research and Development Activity
ATTN: AMSRD-AAR-AIL-F
Picatinny Arsenal, NJ 07806

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REPORT NO. 06-04A3 **NOVEMBER 2006**

TRANSPORTABILITY TESTING OF THE
JOINT MODULAR INTERMODAL PLATFORM (JMIP)
TP-94-01, REV. 2, JUNE 2004,
"TRANSPORTABILITY TESTING PROCEDURES"

ABSTRACT

The U.S. Army Defense Ammunition Center (DAC), Validation Engineering Division (SJMAC-DEV), was tasked by the Logistics Research and Development Activity (AMSRD-AAR-AIL-F), Picatinny Arsenal, NJ to conduct transportability retesting on the Joint Modular Intermodal Platform (JMIP) manufactured by SEA BOX Inc, East Riverton, NJ. The testing was conducted in accordance with TP-94-01, Revision 2, June 2004 "Transportability Testing Procedures."

The major change on the JMIP from the unit previously tested (Report 06-04A2) was that the blocks and pins that hold the A-frame in the transport position were redesigned.

The objective of the testing was to evaluate the Joint Modular Intermodal Platform (JMIP) when transportability tested in accordance with TP-94-01, Revision 2, June 2004 for use during the Limited Military Utility Assessment (LMUA). The retest was to determine if the JMIP could be transported on/off road in an intermodal container. Previously the JMIP had successfully completed the on/off road testing with a PLS truck (Report 06-04A1).

The following observations resulted from the testing of JMIP:

1. Design changes included changing the blocks and pins that hold the A-frame in the container transport position. Also, the A-frame was more upright which corrected the problem with the bail bar striking the inside of the container door during transport.

2. Some movement of the adjustment bolt on the cams did occur during the testing. The movement of the cam locking bolt was not significant enough to cause excessive movement of the JMIP. Future designs of the cam locking devices should prevent the bolts from moving in or out.

3. Final inspection revealed that the rubber bumper on the driver's side was damaged.

4. The plate and corner locking mechanisms are susceptible to damage when the JMIP is moved using a forklift at the A-frame end.

The JMIP, with interface frames, as currently designed, is adequate, to be used to transport the Navy JMIC containers with ammunition, on/off road, in an intermodal container during the LMUA.

The maximum gross weight (platform and payload weight) is not to exceed 15,000 pounds during the LMUA.

Prepared by:

PHILIP W. BARICKMAN
Lead Validation Engineer

Reviewed by:

JERRY W. BEAVER
Chief, Validation Engineering Division

U.S. ARMY DEFENSE AMMUNITION CENTER

VALIDATION ENGINEERING DIVISION
MCALESTER, OK 74501-9053

REPORT NO. 06-04A3

Transportability Testing of the Joint Modular Intermodal Platform (JMIP)
TP-94-01, Revision 2, June 2004 "Transportability Testing Procedures"

TABLE OF CONTENTS

PART 1 – INTRODUCTION

A. BACKGROUND. The U.S. Army Defense Ammunition Center (DAC), Validation Engineering Division (SJMAC-DEV), was tasked by the Logistics Research and Development Activity (AMSRD-AAR-AIL-F), Picatinny Arsenal, NJ to conduct transportability retesting on the Joint Modular Intermodal Platform (JMIP) manufactured by SEA BOX Inc, East Riverton, NJ. The testing was conducted in accordance with TP-94-01, Revision 2, June 2004 "Transportability Testing Procedures."

The major change on the JMIP from the unit previously tested (Report 06-04A2) was that the blocks and pins that hold the A-frame in the transport mode were redesigned.

B. AUTHORITY. This test was conducted IAW mission responsibilities delegated by the U.S. Army Joint Munitions Command (JMC), Rock Island, IL. Reference is made to the following:

1. AR 740-1, 15 June 2001, Storage and Supply Activity Operation.

2. OSC-R, 10-23, Mission and Major Functions of U.S. Army Defense Ammunition Center (DAC) 21 Nov 2000.

C. OBJECTIVE. The objective of the testing was to evaluate the Joint Modular Intermodal Platform (JMIP) when transportability tested in accordance with TP-94-01, Revision 2, June 2004 for use during the Limited Military Utility Assessment (LMUA). The retest was to determine if the JMIP could be transported on/off road in an intermodal container. Previously the JMIP had successfully completed the on/off road testing with a PLS truck (Report 06-04A1).

D. OBSERVATIONS.

1. Design changes included changing the blocks and pins that hold the A-frame in the container transport position. Also, the A-frame was more upright which corrected the problem with the bail bar striking the container door during transport.

2. Some movement of the adjustment bolt on the cams did occur during the testing. The movement of the cam locking bolt was not significant enough to cause excessive movement of the JMIP. Future designs of the cam locking devices should prevent the bolts from moving in or out.

3. Final inspection revealed that the rubber bumper on the driver's side was damaged.

4. The plate and corner locking mechanisms are susceptible to damage when the JMIP is moved using a forklift at the A-frame end.

E. CONCLUSION. The JMIP, with interface frames, as currently designed, is adequate, to be used to transport the Navy JMIC container with ammunition, on/off road, in an intermodal container during the LMUA.

The maximum gross weight (platform and payload weight) is not to exceed 15,000 pounds during the LMUA.

PART 2 - ATTENDEES

ATTENDEE	MAILING ADDRESS
Philip Barickman DSN 956-8992 (918) 420-8992	Director U.S. Army Defense Ammunition Center ATTN: SJMAC-DEV 1 C Tree Road, Bldg. 35 McAlester, OK 74501-9053
Michael S. Bartosiak DSN 956-8083 (918) 420-8083	Director U.S. Army Defense Ammunition Center ATTN: SJMAC-DET 1 C Tree Road, Bldg. 35 McAlester, OK 74501-9053
Richard Garside DSN 956-8050 (918) 420-8050	Director U.S. Army Defense Ammunition Center ATTN: SJMAC-DET 1 C Tree Road, Bldg. 35 McAlester, OK 74501-9053
Tom Sieffert (973) 724-7446	U.S. Army Armament Research, Development and Engineering Center Logistics Research & Engineering Dir. ATTN: AMSRD-AAR-AIL-F Picatinny Arsenal, NJ 07806-5001

PART 3 - TEST EQUIPMENT

1. Joint Modular Intermodal Platform
   Manufactured by SEA BOX, East Riverton, NJ
   Model Number: J-MIP LN702
   Serial Number: 00002
   Date of Manufacture: 27 February 2006
   Tare Weight: 3,960 pounds

2. Joint Modular Intermodal Container
   Manufactured by British Aerospace Engineering
   Weight: 310 pounds
   Length: 51-3/4 inches
   Width: 43-3/4 inches
   Height: 43-1/4 inches

3. Joint Modular Intermodal Container
   Manufactured by Naval PHST Center - Earle, NJ
   Closed JMIC
   Weight: 325 pounds
   Length: 51-3/4 inches
   Width: 43-3/4 inches
   Height: 43 inches

4. Joint Modular Intermodal Container
   Manufactured by Naval PHST Center – Earle, NJ
   Open Framed JMIC
   Weight: 285 pounds
   Length: 51-3/4 inches
   Width: 43-3/4 inches
   Height: 43 inches

5. Palletized Load System Truck
   Model #: M1074
   Manufactured by Oshkosh Truck Corporation, Oshkosh, WI
   ID #: 10T2P1NH6N1044011
   NSN: 2320-01-304-2277
   Serial #: 44011
   Curb Weight: 55,000 pounds

6. Truck, Tractor, MTV, M1088 A1
   ID #: J0229
   NSN: 232001-447-3893
   VSN: NL1FSC
   MFG Serial #: T-018488EFJM
   Weight: 19,340 pounds

7. Semitrailer, flatbed, breakbulk/container transporter, 34 ton
   Model #: M872A1
   Manufactured by Heller Truck Body Corporation, Hillsdale, NJ
   ID #: 11-1505 NX05NZ
   NSN: 2330 01 109 8006
   Weight: 19,240 pounds

8. Intermodal Container
   ID # CMCU 200006-8
   Date of Manufacture: 06/99
   Manufactured by Charleston Marine Containers, Charleston, SC
   Tare Weight: 4,870 pounds
   Maximum Gross Weight: 67,200 pounds

PART 4 - TEST PROCEDURES

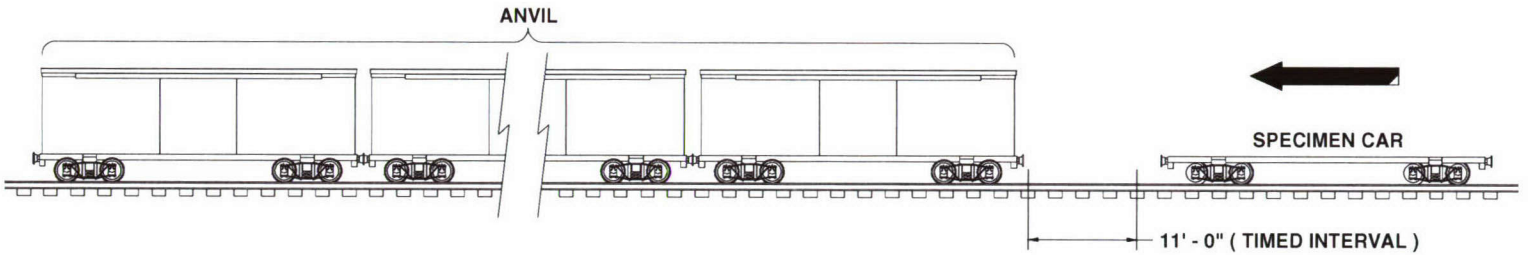
The test procedures outlined in this section were extracted from TP-94-01, "Transportability Testing Procedures," Revision 2, June 2004, for validating tactical vehicles and outloading procedures used for shipping munitions by tactical truck, railcar, and ocean-going vessel.

The rail impact will be conducted with the loaded intermodal container secured directly to the railcar. Inert (non-explosive) items were used to build the load. The test loads were prepared using the blocking and bracing procedures proposed for use with munitions (***see Part 6- Drawings for procedures***). The weight and physical characteristics (weights, physical dimensions, center of gravity, etc.) of the test loads were similar to live (explosive) ammunition.

A. RAIL TEST. RAIL IMPACT TEST METHOD. The test load or vehicle will be secured to a flatcar. The equipment needed to perform the test will include the specimen (hammer) car, four empty railroad cars connected together to serve as the anvil, and a railroad locomotive. The anvil cars will be positioned on a level section of track with air and hand brakes set and with draft gears compressed. The locomotive unit will push the specimen car toward the anvil at a predetermined speed, then disconnect from the specimen car approximately 50 yards away from the anvil cars allowing the specimen car to roll freely along the track until it strikes the anvil. This will constitute an impact. Impacting will be accomplished at speeds of 4, 6, and 8.1 mph in one direction and at a speed of 8.1 mph in the reverse direction. The tolerance for the speeds is plus 0.5 mph, minus 0.5 mph for the 4 mph and 6 mph impacts, and plus 0.5 mph, minus 0 mph for the 8.1 mph impacts. The impact speeds will be determined by using an electronic counter to measure the time for the specimen car to traverse an 11-foot distance immediately prior to contact with the anvil cars (see Figure 1).

ASSOCIATION OF AMERICAN RAILROADS (AAR)

STANDARD TEST PLAN



4 BUFFER CARS (ANVIL)
WITH DRAFT GEAR
COMPRESSED AND AIR BRAKES IN A SET POSITION

ANVIL CAR TOTAL WT. 250,000 LBS (APPROX)

SPECIMEN CAR IS RELEASED BY SWITCH ENGINE TO
ATTAIN: IMPACT NO. 1 @ 4 MPH
IMPACT NO. 2 @ 6 MPH
IMPACT NO. 3 @ 8.1 MPH

THEN THE CAR IS REVERSED AND RELEASED BY SWITCH ENGINE TO ATTAIN:

IMPACT NO. 4 @ 8.1 MPH

Figure 1. Rail Impact Sketch

B. ON/OFF ROAD TEST.

1. HAZARD COURSE. The test load or vehicle will be transported over the 200-foot-long segment of concrete-paved road consisting of two series of railroad ties projecting 6 inches above the level of the road surface. The hazard course will be traversed two times (see Figure 2).

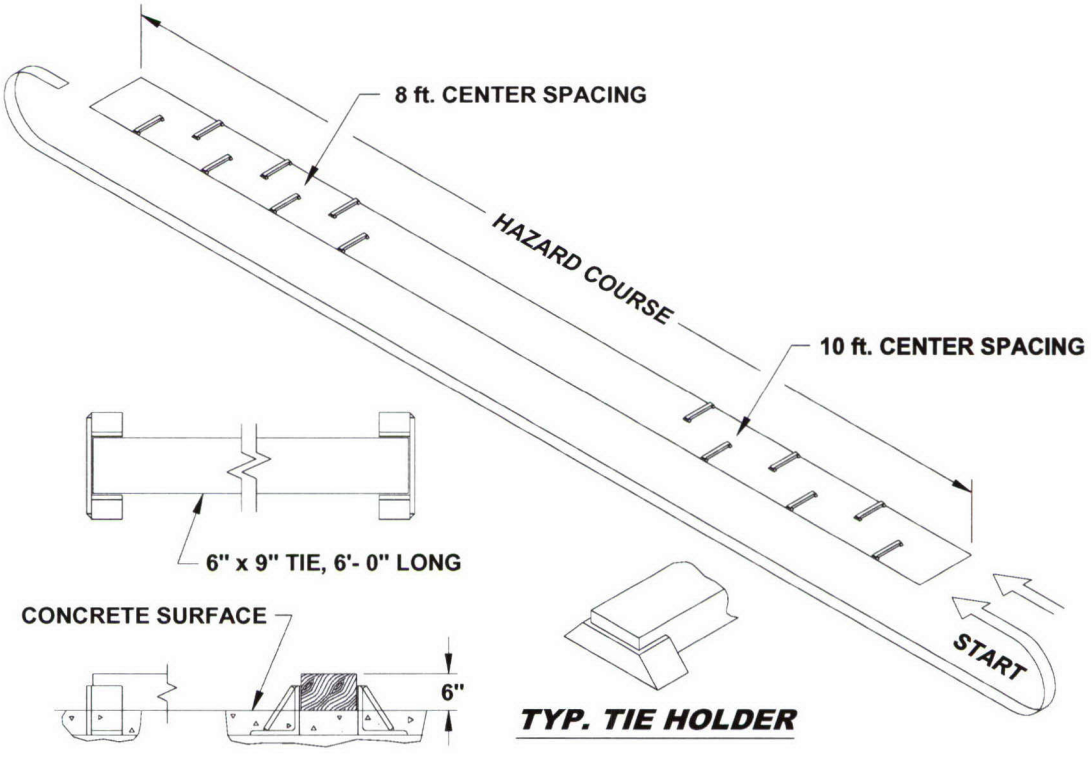


Figure 2. Hazard Course Sketch

a. The first series of 6 ties are spaced on 10-foot centers and alternately positioned on opposite sides of the road centerline for a distance of 50 feet.

b. Following the first series of ties, a paved roadway of 75 feet separates the first and second series of railroad ties.

c. The second series of 7 ties are spaced on 8-foot centers and alternately positioned on opposite sides of the road centerline for a distance of 48 feet.

d. The test load is driven across the hazard course at speeds that will produce the most violent vertical and side-to-side rolling reaction obtainable in traversing the hazard course (approximately 5 mph).

2. ROAD TRIP. The test load or vehicle will be transported for a distance of 30 miles over a combination of roads surfaced with gravel, concrete, and asphalt. The test route will include curves, corners, railroad crossings and stops and starts. The test load or vehicle will travel at the maximum speed for the particular road being traversed, except as limited by legal restrictions.

3. PANIC STOPS. During the road trip, the test load or vehicle will be subjected to three (3) full airbrake stops while traveling in the forward direction and one in the reverse direction while traveling down a 7 percent grade. The first three stops are at 5, 10, and 15 mph while the stop in the reverse direction is approximately 5 mph. This testing will not be required if the Rail Impact Test is performed.

4. WASHBOARD COURSE. The test load or vehicle will be driven over the washboard course at a speed that produces the most violent response in the vertical direction.

C. OCEAN-GOING VESSEL TEST. Shipboard Transportation Simulator (Test Method 5). The Shipboard Transportation Simulator (STS) is used for testing loads in 8-foot-wide by 20-foot-long intermodal freight containers. The specimen shall be positioned onto the STS and securely locked in place using the cam lock at each corner. Using the procedure detailed in the operating instructions, the STS shall begin oscillating at an angle of 30 degrees, plus or minus 2 degrees, either side of vertical center and a frequency of 2 cycles-per-

minute (30 seconds, plus or minus 2 seconds) for a duration of two (2) hours. This frequency shall be observed for apparent defects that could cause a safety hazard. The frequency of oscillation shall then be increased to 4 cycles-per-minute (15 seconds, plus or minus one second per cycle) and the apparatus operated for two (2) hours. If an inspection of the load does not indicate an impending failure, the frequency of oscillation shall be further increased to 5 cycles-per-minute (12 seconds, plus or minus one second per cycle), and the apparatus operated for four (4) hours. The operation does not necessarily have to be continuous; however, no changes or adjustments to the load or load restraints shall be permitted at any time during the test. After once being set in place, the test load (specimen) shall not be removed from the apparatus until the test has been completed or is terminated.

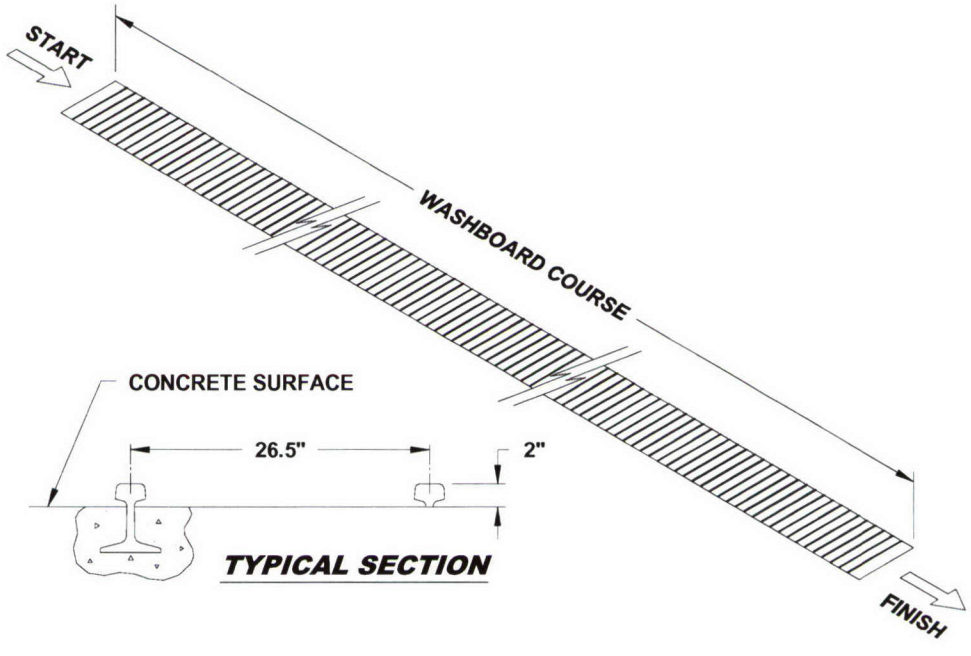


Figure 3. Washboard Course Sketch

PART 5 - TEST RESULTS

5.1

Test Specimen: SEA BOX JMIP in an Intermodal Container.

Payload: 4 BAE JMICs and 2 Navy JMICs.

Testing Date: 20 September 2006

Gross Weight: 20,170 pounds (Including JMIP, interface frames, JMICs and intermodal container).

A. ON/OFF ROAD TESTS.

1. HAZARD COURSE.

Photo 1. Hazard Course Testing of the JMIP in the Intermodal Container.

Pass No.	Elapsed Time	Avg. Velocity (mph)
1	24 Seconds	6
2	26 Seconds	6

Figure 4.

Remarks:

1. Figure 4 lists the average speeds of the test load through the Hazard Course.
2. The adjustment bolts on the cams moved during Passes 1 & 2. The JMIP remained secure in the container. The pin that prevents the cam from rotating does not rest against the cam which may allow the cams and adjustment bolts to move.

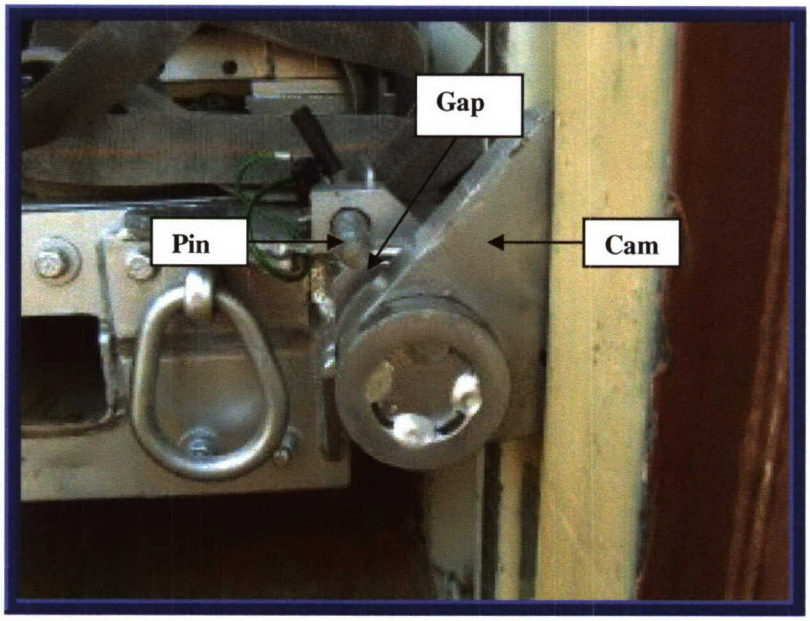


Photo 2. Pin Distance from the Cam.

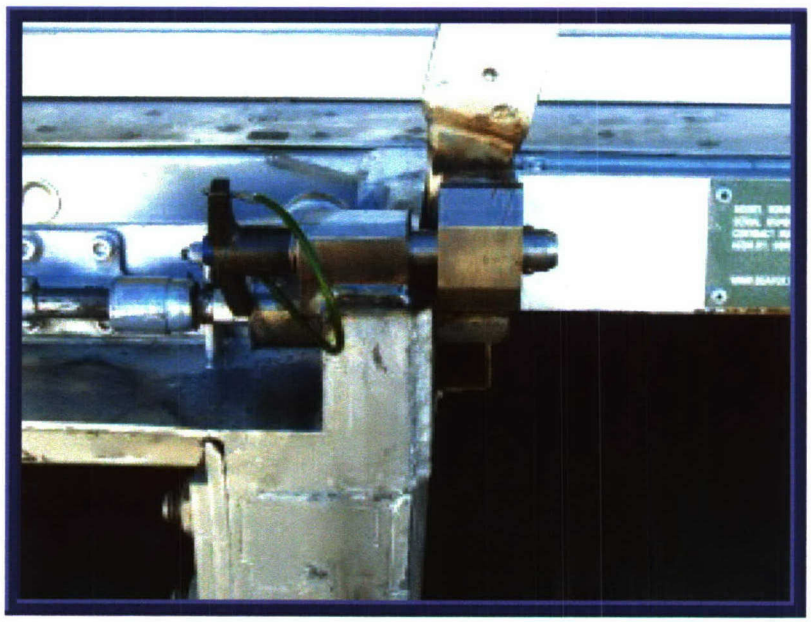


Photo 3. Redesigned Pin and Bolt.

2. **ROAD TRIP.**

Remarks:

1. The Road Trip was conducted between the Road Hazard Course Passes #2 and #3.
2. Inspection following the Road Trip revealed no damage or movement of the JMIP.

3. **PANIC STOPS.** Inspection following the completion of the forward 5 MPH panic stop revealed that the JMIP slid toward the closed end of the container, and on the reverse 5 MPH panic stop the JMIP slid toward the door of the container. The JMIP remained secured in the container.

4. **HAZARD COURSE.**

Pass No.	Elapsed Time	Avg. Velocity (mph)
3	27 Seconds	5
4	25 Seconds	6

Figure 5.

Remarks:

1. Figure 5 lists the average speeds of the test load through the Hazard Course.
2. The adjustment bolts on the cams moved during Passes #3 & #4. The JMIP remained secure in the container.

5. **WASHBOARD COURSE.**

Remark:

Inspection following the Washboard Course revealed that the JMIP had moved toward the container door 0.25 inches.

Photo 4. Washboard Course Testing JMIP.

B. OBSERVATIONS.

1. Some movement of the adjustment bolt on the cams did occur during the testing. The movement of the cam locking bolt was not significant enough to cause excessive movement of the JMIP. Future designs of the cam locking devices should prevent the bolts from moving in or out.

2. Final inspection revealed that the rubber bumper on the driver's side was damaged.

Photo 5. Damaged Rubber Bumper.

3. The plate and corner locking mechanisms are susceptible to damage when the JMIP is moved using a forklift at the A-frame end.

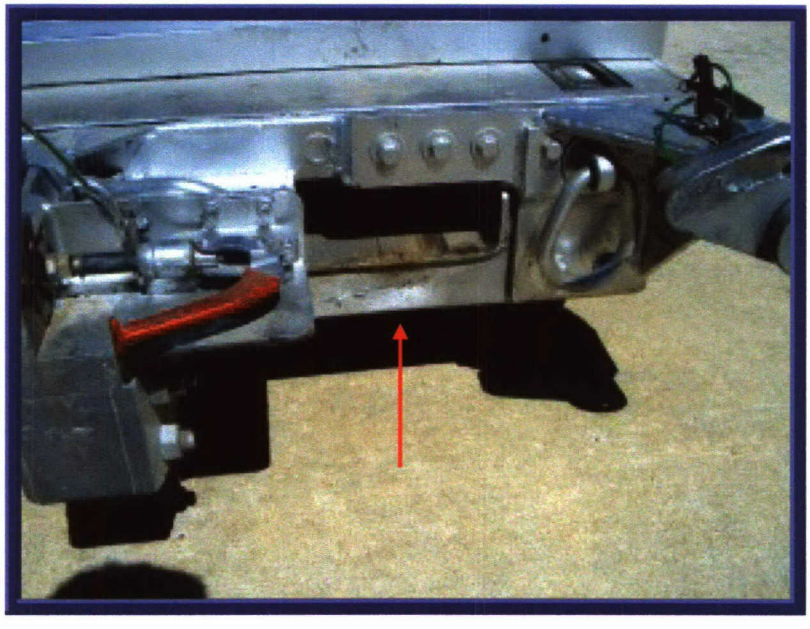


Photo 6. Damage of JMIP at the Forklift Pocket.

C. CONCLUSION. The JMIP, with interface frames, as currently designed, is adequate to be used to transport the Navy JMIC containers with ammunition, on/off road, in an intermodal container during the LMUA.

The maximum gross weight (platform and payload weight) is not to exceed 15,000 pounds during the LMUA.

PART 6 – DRAWINGS

The following drawing represents the load configuration that was subjected to the test criteria.

TEST SKETCH

LOADING AND BRACING OF JOINT MODULAR INTERMODAL CONTAINERS (JMICS) ON THE JOINT MODULAR INTERMODAL PLATFORM (JMIP)

THIS TEN PAGE DOCUMENT DEPICTS NAVY AND BAE JMIC PROTOTYPES ON A SEABOX PROTOTYPE JMIP FOR INTEGRATION TRANSPORTABILITY TESTING AT AN APPROXIMATE 15,000 LBS GROSS LOAD

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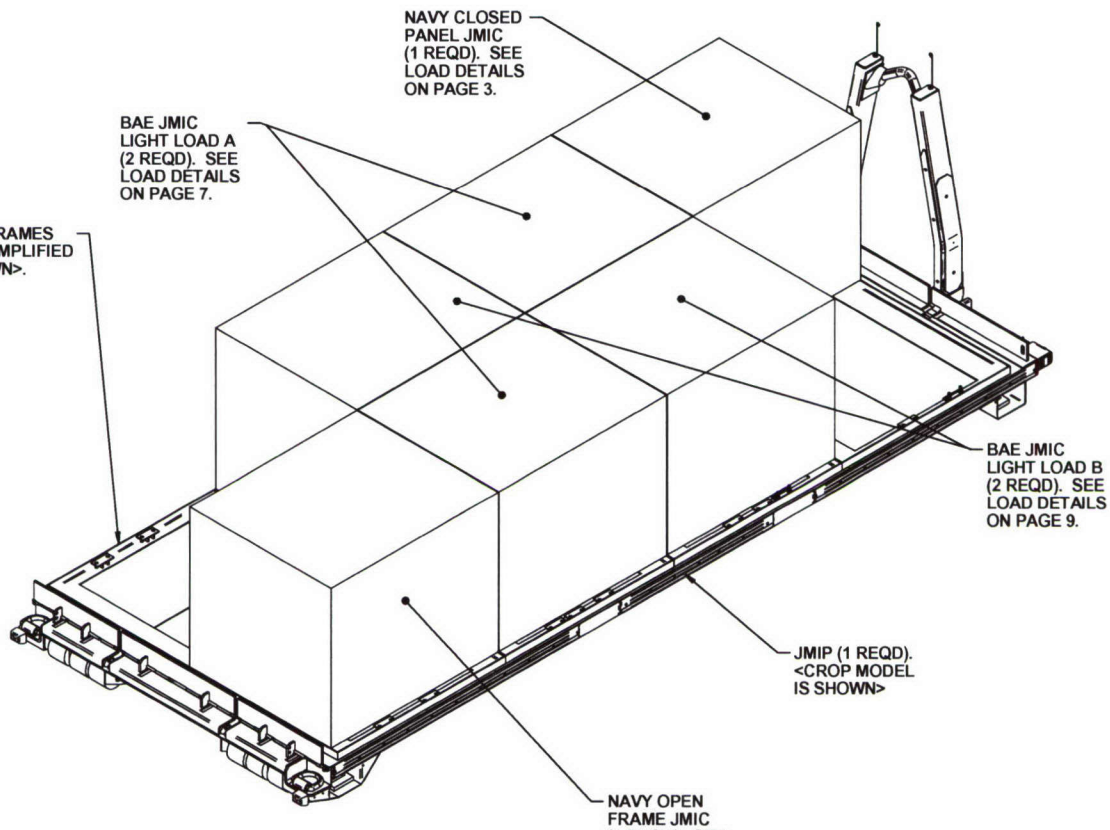
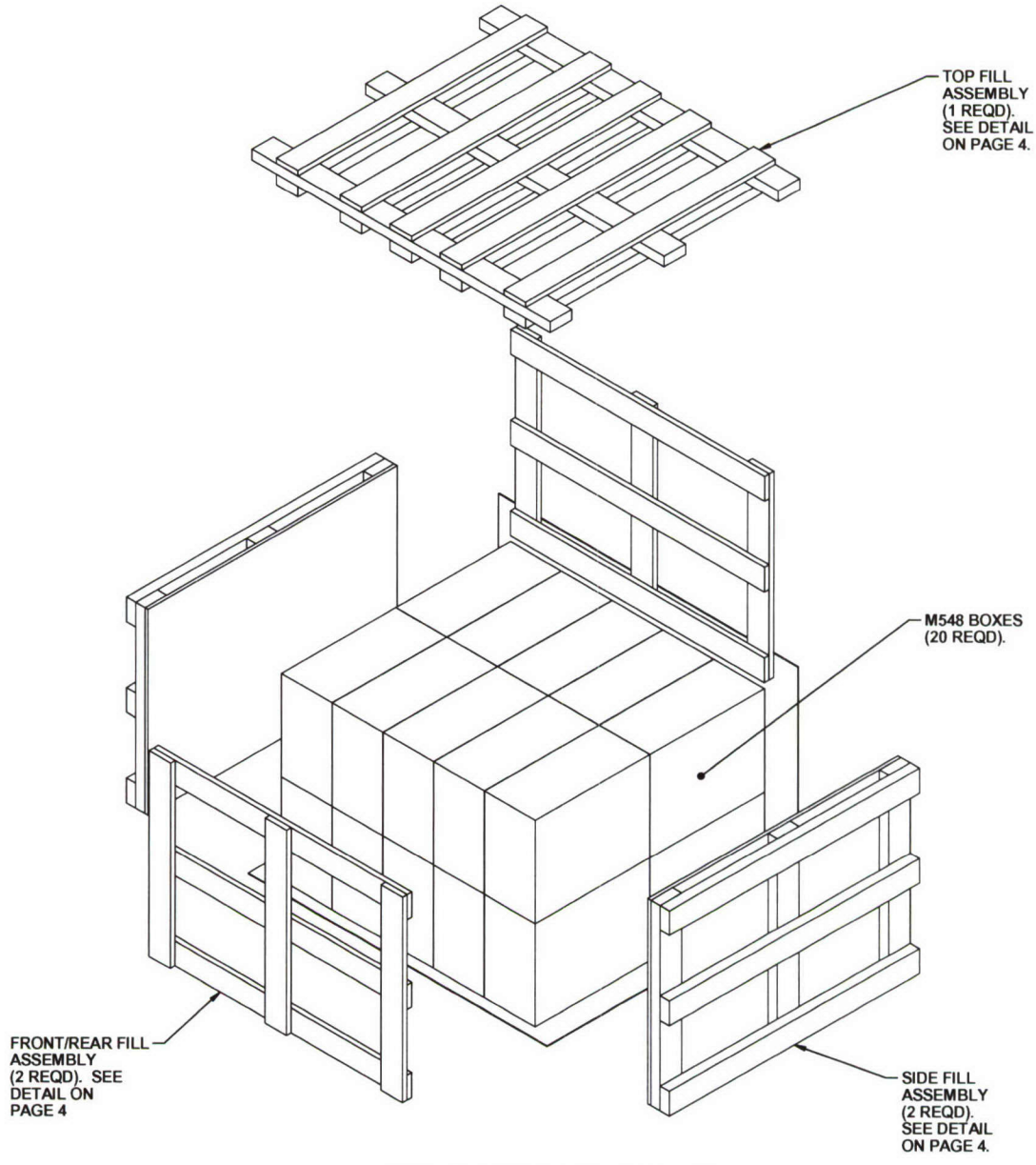


ISOMETRIC VIEW

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
NAVY PANEL JMIC	1	2,971 LBS
NAVY FRAME JMIC	1	2,916 LBS
BAE JMIC (4 BOXES)	2	1,832 LBS
BAE JMIC (8 BOXES)	2	2,792 LBS
INTERFACE FRAMES	4	580 LBS
JMIP		3,800 LBS
TOTAL WEIGHT		14,891 LBS (APPROX)

6 JMIC UNIT LOAD ON JOINT MODULAR INTERMODAL PLATFORM (JMIP)

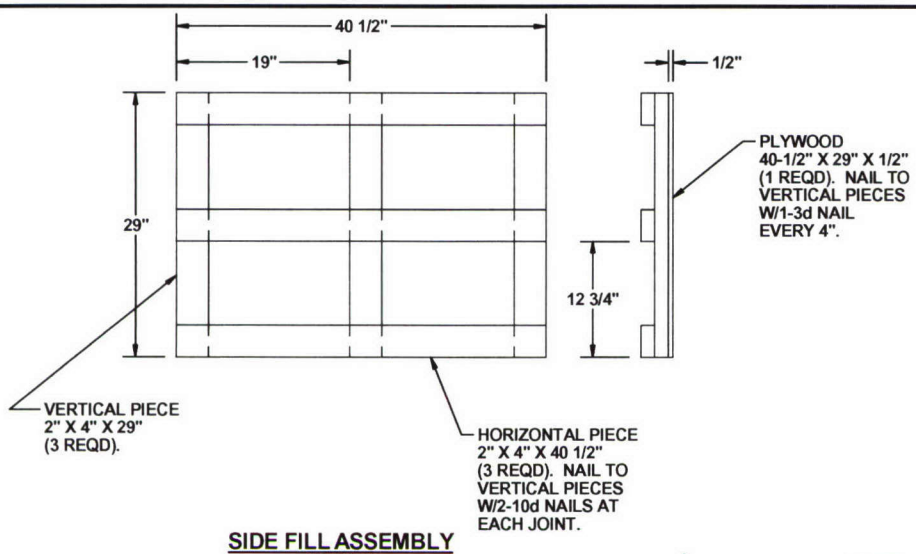


NAVY CLOSED PANEL JMIC UNIT

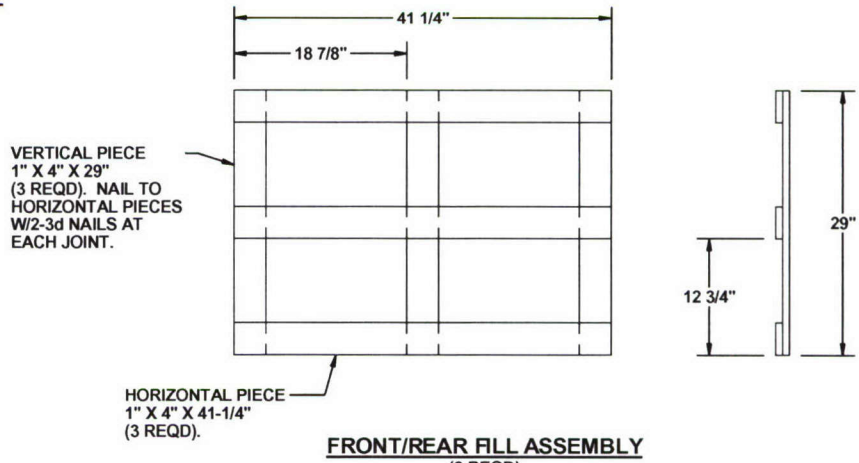
20 M548 BOXES @ 125 LBS	2,500 LBS
DUNNAGE	146 LBS
CLOSED PANEL NAVY JMIC	325 LBS
TOTAL WEIGHT	2,971 LBS (APPROX)
CUBE	56.4 CU FT (APPROX)

BILL OF MATERIAL

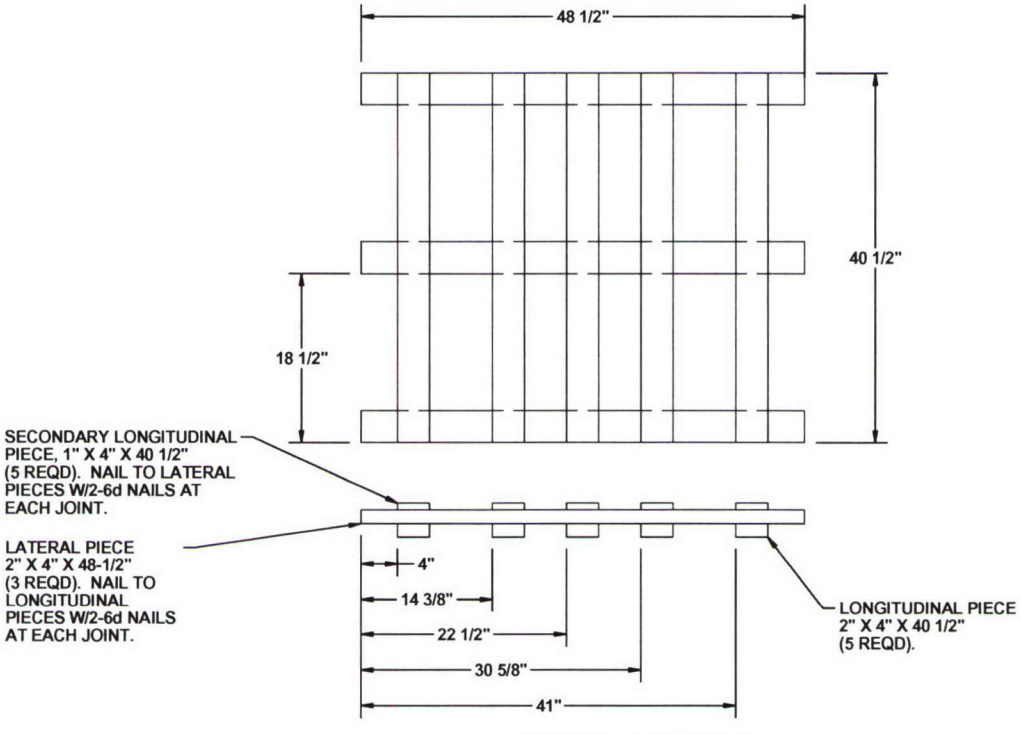
LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	52	18
2" X 4"	64	43
NAILS	**NO. REQD**	**POUNDS**
3d (1-1/4")	84	.16
6d (2")	60	.35
10d (3")	36	.54
NAVY PANEL JMIC	1 REQD	325 LBS
1/2 PLYWOOD	17 SQ FT	23 LBS



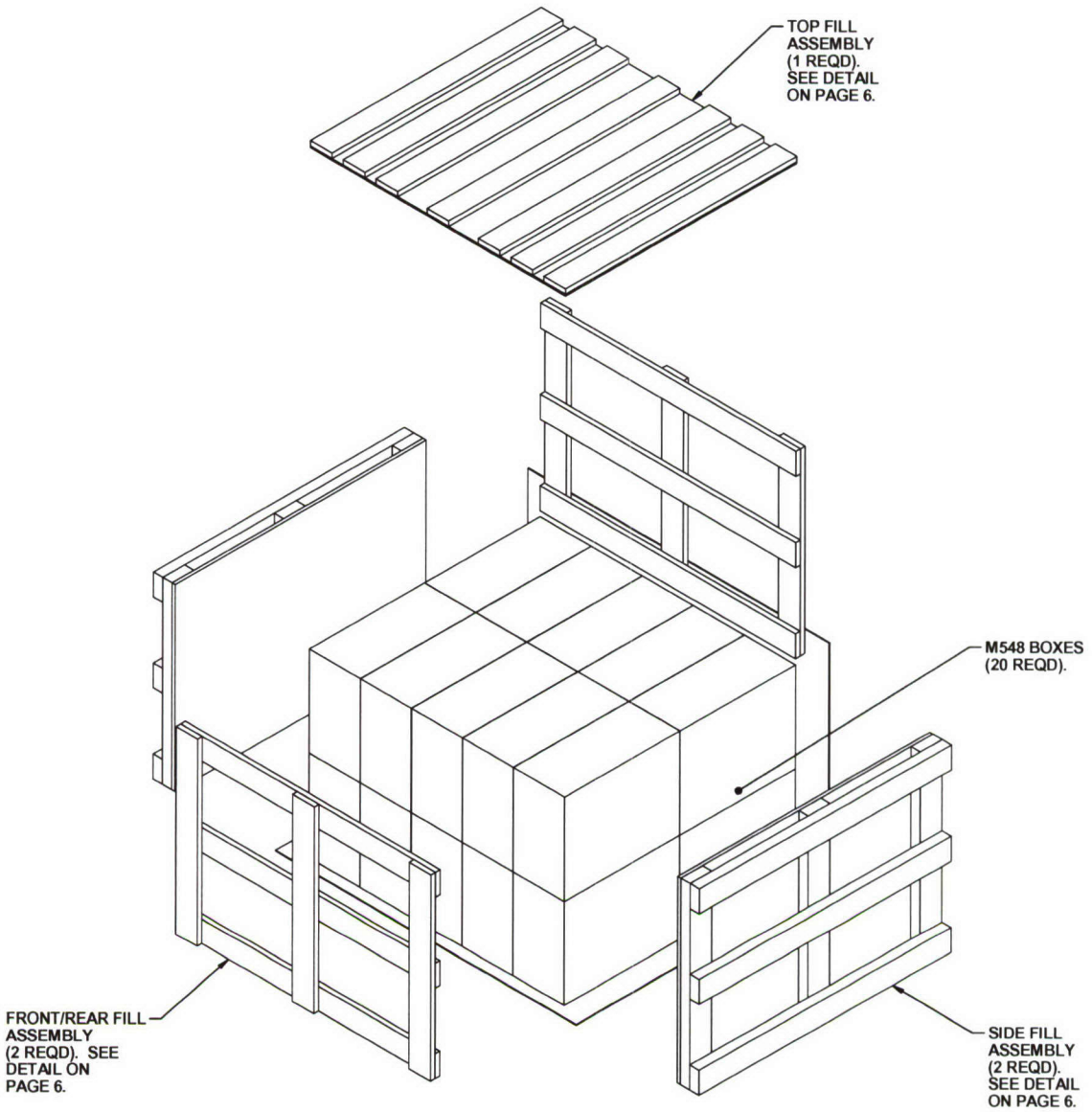
SIDE FILL ASSEMBLY
(2 REQD)



FRONT/REAR FILL ASSEMBLY
(2 REQD)



TOP FILL ASSEMBLY
(1 REQD)



NAVY OPEN FRAME JMIC UNIT

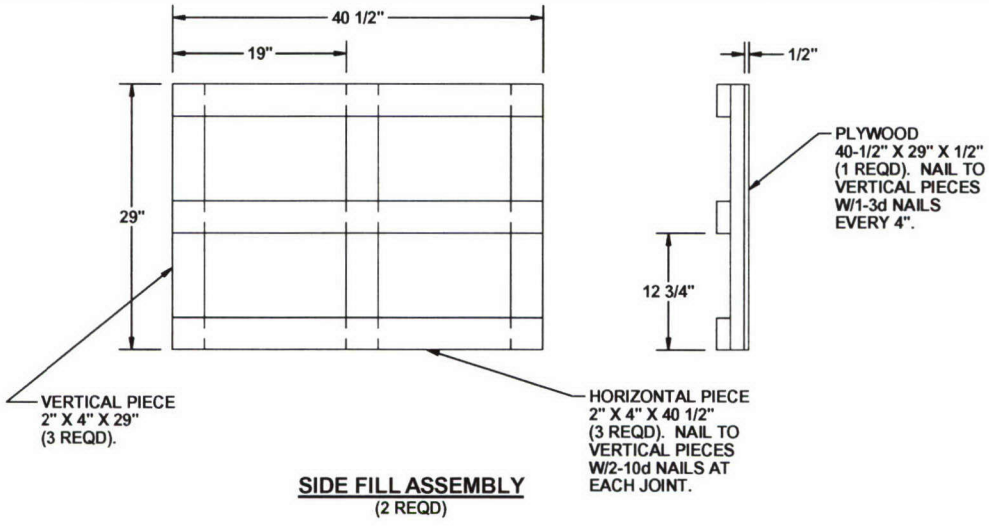
STRAPPING NOT SHOWN, SEE STRAPPING DETAIL 1 & 2 ON PAGE 7 FOR FURTHER INFORMATION.

20 M548 BOXES @ 125 LBS	2,500 LBS
DUNNAGE	127 LBS
OPEN FRAME NAVY JMIC	285 LBS
TOTAL WEIGHT	2,912 LBS (APPROX)
CUBE	56.4 CU FT (APPROX)

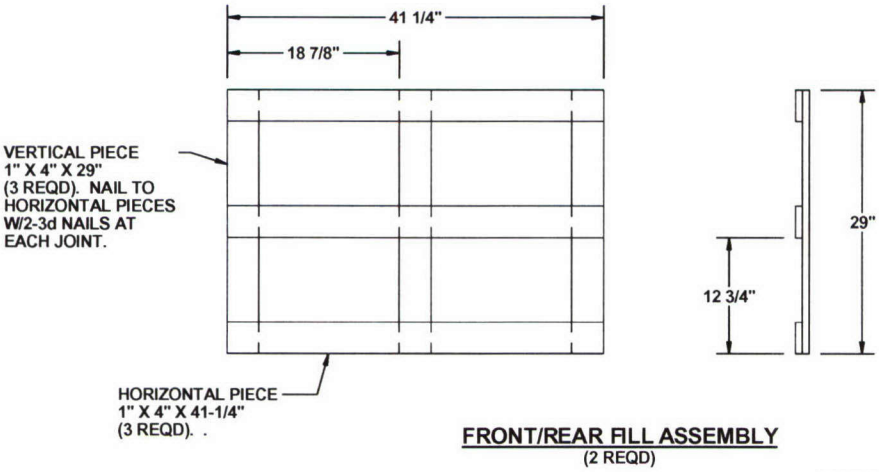
BILL OF MATERIAL

LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	57	19
2" X 4"	35	24
NAILS	**NO. REQD**	**POUNDS**
3d (1-1/4")	126	.23
10d (3")	36	.55

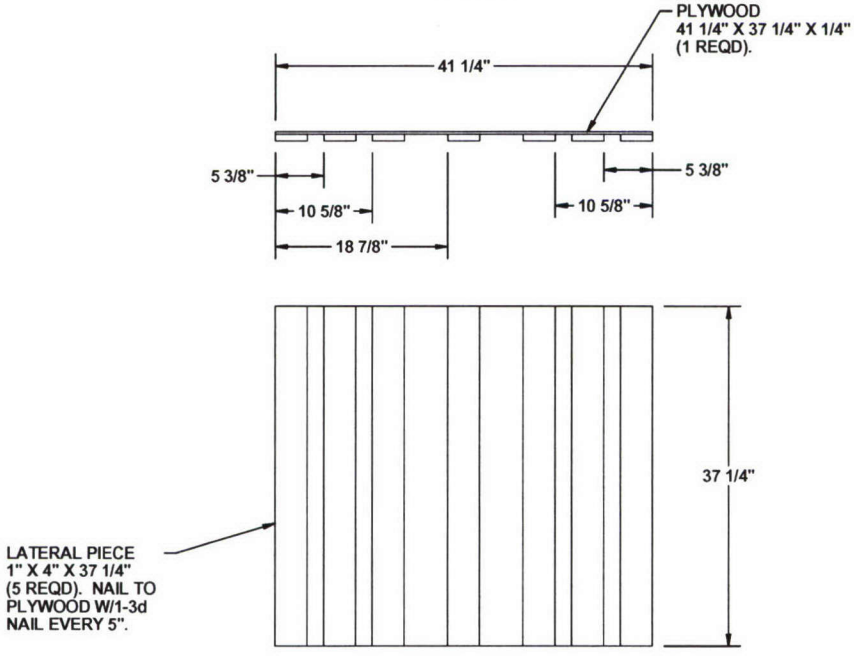
NAVY OPEN FRAME JMIC	1 REQD	285 LBS
PLYWOOD, 1/4	11 SQ FT	8 LBS
PLYWOOD, 1/2	17 SQ FT	23 LBS
STEEL STRAPPING, 1-1/4"	56' REQD	9 LBS
SEAL FOR 1-1/4" STRAPPING	4 REQD	NIL



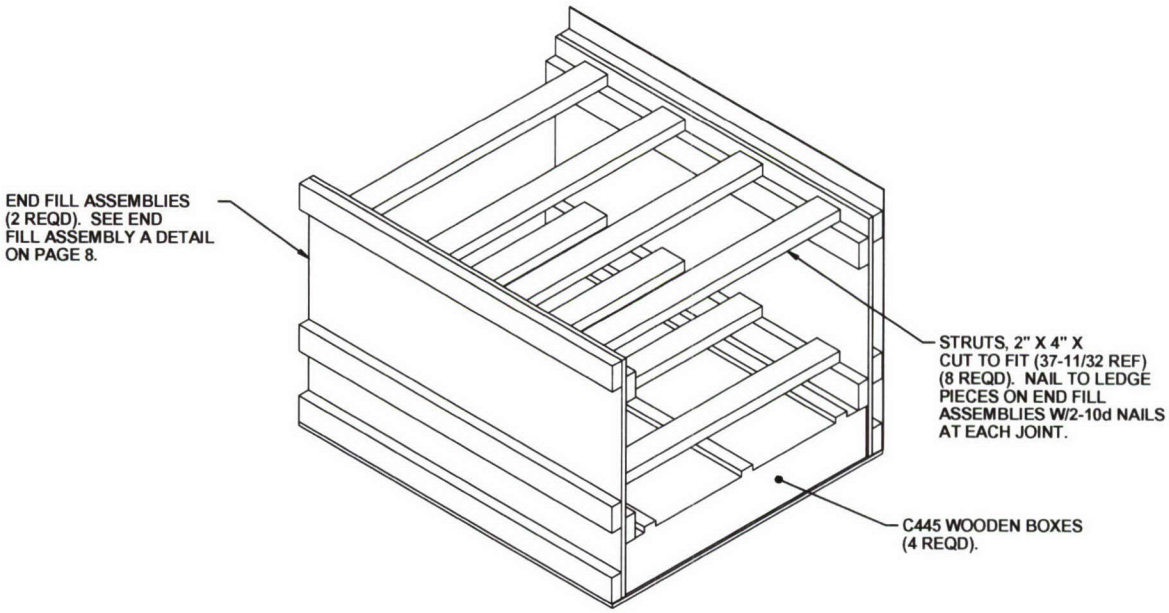
SIDE FILL ASSEMBLY
(2 REQD)



FRONT/REAR FILL ASSEMBLY
(2 REQD)



TOP FILL ASSEMBLY
(1 REQD)



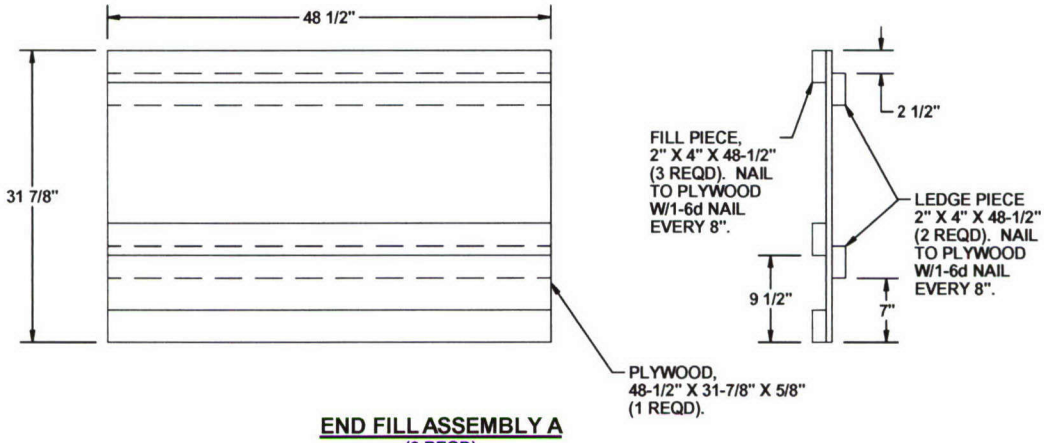
BAE JMIC UNIT - LIGHT LOAD A

(2 REQD)

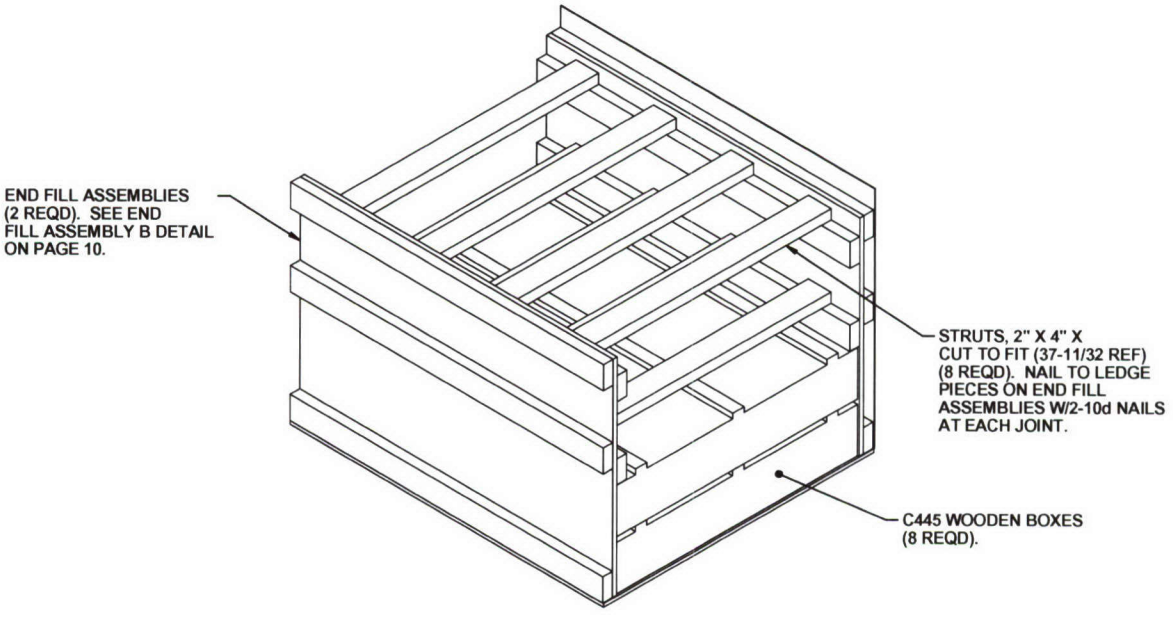
4 C445 BOXES @ 120 LBS	480 LBS
DUNNAGE	126 LBS
BAE JMIC	310 LBS
TOTAL WEIGHT	916 LBS (APPROX)
CUBE	56.7 CU FT (APPROX)

BILL OF MATERIAL

LUMBER	LINEAR FEET	BOARD FEET
2" X 4"	66	44
NAILS	**NO. REQD**	**POUNDS**
6d (2")	60	.35
10d (3")	32	.48
BAE JMIC	1 REQD	310 LBS
5/8 PLYWOOD	22 SQ FT	37 LBS



END FILL ASSEMBLY A
(2 REQD)



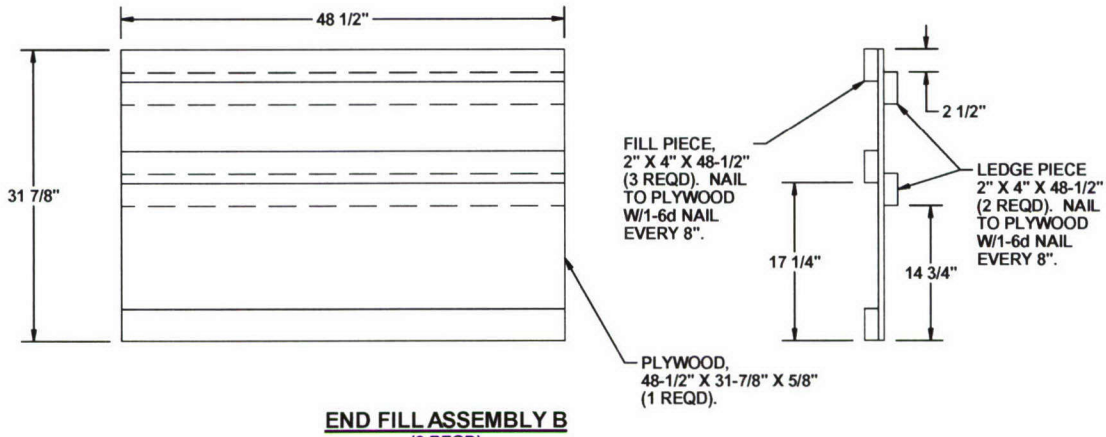
BAE JMIC UNIT - LIGHT LOAD B

(2 REQD)

8 C445 BOXES @ 120 LBS	960 LBS
DUNNAGE	126 LBS
BAE JMIC	310 LBS
TOTAL WEIGHT	1,396 LBS (APPROX)
CUBE	56.7 CU FT (APPROX)

BILL OF MATERIAL

LUMBER	LINEAR FEET	BOARD FEET
2" X 4"	66	44
NAILS	**NO. REQD**	**POUNDS**
6d (2")	60	.35
10d (3")	32	.48
BAE JMIC	1 REQD	310 LBS
5/8 PLYWOOD	22 SQ FT	37 LBS



END FILL ASSEMBLY B
(2 REQD)